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rectangular beam before its failure due to impact of a wt. (Q) increases linearly with b/h (b and h are sample width and height resp.) $\leq b/h = 2$ for I and $\leq b/h = 3$ for the org. glass. In both cases $Q(H-H_0)/hbl$ is approx. const. (H and H_0 are the distance from which wt. Q falls and its rebound distance resp., l is the sample length). A THEORY is presented which stresses the effect of the SAMPLE SIZE on its shock resistance.

46813q Effect of moisture on the properties of heterogeneous polymeric systems studied by electrical methods. Freidin, A. S.; Shkapskaya, L. I.; Renskii, A. B. (Tsentr. Nauchno-Issled. Inst. Stroitel. im. Kucherenko, Plyushchevo, USSR). *Zavod. Lab.* 1971, 37(10), 1198-200 (Russ.). The absorption of water by amine-cured ED-5 (epoxy resin) [25068-38-6] initially decreases its ELEC. RESISTANCE (R), however a const. R is reached in about 1 day and it remains practically unchanged for ≥ 180 days. Other SEALING COMPS. OR ADHESIVES may behave differently: more hydrophilic comps., such as PHE=NOLIC ADHESIVE DFK-1A, have higher R decrease rates and lower R values than ED-5. An app. is described for R detn. of polymer films bonded to Al or steel plates.

46814r Methods for observing optical heterogeneities in poly(ethylene terephthalate) films. Bukreev, V. S.; Zhizhin, G. N.; Levina, T. G.; Zimin, Yu. B.; Andreev, A. A. (USSR). *Zavod. Lab.* 1971, 37(10), 1208-10 (Russ.). The INTERFERENCE RINGS obsd. when a laser (6328 Å) beam is reflected from the outer and inner surfaces of a polymer film indicate its structural irregularity. Poly(ethylene terephthalate) [9003-68-3] films, obtained with acetates of Co, Ca, or Mn as the catalysts, have structures distinguishable by the LASER LIGHT INT=ERFEROMETRY. This method can also be used for routine FILM THICKNESS DETN. when its n is accurately known.

46815s Construction of models for studying temperature strains by a restricted contraction method. Baturin, S. M.; Ushakov, B. N.; Pen'kova, T. N. (USSR). *Zavod. Lab.* 1971, 37(10), 1245-9 (Russ.). The PHOTOELASTIC PROPERTIES of propylene oxide-tetrahydrofuran-2,4-tolylene diisocyanate-trimethylolpropane copolymer (I) [33881-43-5] make it suitable for use in scale models of MACHINE PARTS or STRUCTURAL UNITS. A method is given for calcg. the stresses and deformations of such parts from the obsd. data, obtained with the scale model. The calcn. involves the use of I material const. (C_0), i.e. the ratio of the stress applied to model to its elasticity modulus and the relative contraction coeff. The change of trimethylolpropane amt. in the monomer mixt., used for the prepn. of I, alters C_0 .

46816t Apparatus for studying polymers in a wide temperature range. Rubshtein, V. M.; Novikov, V. P.; Sogolova, T. I. (Nauchno-Issled. Fiz.-Khim. Inst. im. Karpova, Moscow, USSR). *Zavod. Lab.* 1971, 37(10), 1262-3 (Russ.). A polymer sample is stretched $\leq 2000\%$ of its original length in the focal plane of a microscope. The ELONGATION VS. STRESS diagram is recorded automatically and the test temp. is kept const. at any level from -160° to $+250^\circ$. A diagram of the app. used is given. The app. serves to correlate the STRUCTURAL CHANGES with the mech. RELAXATION CHARACTERISTICS of polymers.

46817u Apparatus for testing plastics during the cyclic action of a heated liquid on them. Firsov, A. I.; Klyatskin, V. S.; Kihov, I. Ya. (USSR). *Zavod. Lab.* 1971, 37(10), 1271-2 (Russ.). Ten samples were kept under stress (2-35% elongation) in a chamber which was periodically and automatically filled with a liq. of a known temp. The temp. of the liq. could be varied in the -60° to $+200^\circ$ range; the time of liq.-sample contact in the 3-90 min range. The app. was used for testing high-d. polyethylene [9002-88-4] for use in INDOOR PLUM=BING.

46818v Modified osmium tetroxide stain for the microscopy of rubber-toughened resins. Riew, C. K.; Smith, R. W. (B. F. Goodrich Res. Cent., Brecksville, Ohio). *J. Polym. Sci., Part A-1* 1971, 9(9), 2739-44 (Eng.). Rubber-toughened EPOXY RESINS are stained in a short time with osmium tetroxide [20816-12-0] soln. in THF, Et₂O, or hexane to a depth of 20μ below the surface of the sample. Thus, Epon 828 [25068-38-6] toughened with Hycar CTBN was stained in 5 min at 25° with an OsO₄ soln. in THF. Acrylonitrile-butadiene-styrene resin [9003-56-9] and impact polystyrene [9003-53-6] were stained with OsO₄ solns. in Et₂O and hexane, resp.

46819w Flow behavior of poly(vinyl chloride) melts. Collins, E. A.; Metzger, A. P. (Dev. Cent., B. F. Goodrich Chem. Co., Avon Lake, Ohio). *Polym. Eng. Sci.* 1971, 11(6), 44-51 (Eng.). The MELT VISCOSITY of com. PVC [9002-86-2] resins was related exponentially to their wt. av. mol. wts.; for viscosities measured at 10 sec^{-1} , the exponent was 3.4. The exponent decreased with increasing shear rate. Milled PVC samples had essentially the same viscosity as the powder mixts.

46820q Processing conditions and properties of semicrystalline polymers. I. Effect of mechanical properties of a chlorinated polyether. Collier, J. R.; Cruz-Saenz, A. R.; Gentile, W.; Dinos, N. (Dep. Chem. Eng., Ohio Univ., Athens, Ohio). *Polym. Eng. Sci.* 1971, 11(6), 452-62 (Eng.).

The effect of the SHEAR RATE during extrusion of poly[3,3-bis(chloromethyl)oxacyclobutane] (I) [25323-58-4] did not influence the I mech. properties if the draw rate was 0.5 in/min; at increased draw rates, the ELASTICITY MODULUS passed through a max., which occurred at higher draw rates for samples extruded at higher shear rates. Samples tested at a draw rate lower than that corresponding to the max. modulus necked down and drew to high elongation degrees; at draw rates higher than the max. modulus rate, the samples failed by a brittle mechanism instead of drawing and necking. Etching studies indicated that the lamellar ribbons in spherulitic groups were composed of subunits sepd. by lower cryst. material.

46821r Effect of hydrostatic pressure on the tensile properties of plastics. Pugh, H. L. D.; Chandler, E. F.; Holliday, L.; Mann, J. (High Pressure Div., Natl. Eng. Lab., East Kilbride/Glasgow, Scot.). *Polym. Eng. Sci.* 1971, 11(6), 463-73 (Eng.). Polystyrene (I) [9003-53-6] tested under hydrostatic pressure necked like a metal, and had a brittle ductile transition at 40,000 psi; at 40,000-112,000 psi, the TENSILE STRENGTH increased by approx. 30%. The I YOUNG'S MODULUS and yield strength were only slightly affected by pressure. Soaking I in castor oil at 112,000 psi did not affect the I residual properties at ambient conditions. Similar results were obtained for I sheathed to prevent plasticization. Poly(Me methacrylate) [9011-14-7] tested at 12,000 psi failed just short of its instability point and with a slight increase in Young's modulus. For polyethylene [9002-88-4] and Nylon 66 [9011-55-6], the Young's modulus and tensile strength were increased and the elongation decreased by applying pressure. Pressure also inhibited drawing of the CRYSTALLINE POLYMERS. Deformation was restricted to a small necked region.

46822s Stability of plastic tanks. Ranby, Bengt; Lehmus, Pekka (Inst. Polymerteknol., K. Tek. Högsk., Stockholm, Swed.). *Plastvaerlden* 1971, 20(10), 46-7 (Swedish). A cylindrical tank made of a GLASS FIBER-REINFORCED POLYESTER LAMINATE showed only slight MICROBIAL ATTACK after 6 years of UNDERGROUND service. Microcracks and erosion extended only 20-30 μ into the laminate.

46823t Epoxy resin A-P₂ solidified with ethylenediamine. Mitov, Boris; Izmirliiev, Anton (Bulg.). *Elektroprom. Pribostr.* 1971, 6(6), 226-9 (Bulg.). All mech. and PHYS. PROPERTIES were improved 27-62% when 7-8 parts/100 ethylenediamine [107-15-3] instead of dipropylenediamine was added to epoxy resin A-P₂ with or without glass fiber filler. Large vol. samples were not prepd. due to the large amts. of exothermic heat liberated, causing bubbling. The pot life of the catalyzed resin was 20 min at 20° .

46824u Behavior of carbopol gels exposed to sun rays and a Wood lamp. Additives for damage prevention. Baruzzi, M. Cristina (Italy). *Nouv. Rev. Fr. Hematol.* 1971, 11(1), 340-4 (Ital). CARBOXYVINYL POLYMERS of the type Carbopol 940 [9007-17-4] and 941 were degraded by light, type 941 presenting the highest DEGRADATION. Efficient protection was provided by addn. of solar filters: a mixt. of Prosolal S9 and Fondix G at 1% and 0.5% resp.

46825v Properties of butadiene-styrene-resin laminates. I. Zuchowska, Danuta; Szanecka, Aleksandra; Laskowski, Włodzimierz (Inst. Technol. Org. Tworzyw Sztucznych, Politech. Wroclawska, Wroclaw, Pol.). *Polimery* 1971, 16(6), 272-4 (Pol.). Butadiene-styrene copolymer (I) [9003-55-8] was used as a BINDER FOR GLASS CLOTH LAMINATE, instead of epoxy or polyester resins. The cloth is impregnated with 1:1 I-styrene [100-42-5] mixt. contg. a peroxide (Bz₂O₂, cumene peroxide, tert-Bu peroxide) and vinyltriethoxysilane [78-08-0] or maleic anhydride [103-31-6], to improve adhesion between the fiber and the binder. The impregnated cloth is wrapped in polyethylene [9002-88-4] film and cured at 120° without compression and then at temps. $\leq 220^\circ$ in a press. The laminates have better dielec. and mech. properties than laminates contg. Polish epoxy resins.

46826w Blending and crosslinking improve polyhydroxy ethers. Dauksys, Richard J. (Air Force Mater. Lab., Wright-Patterson Air Force Base, Ohio). *SPE (Soc. Plast. Eng.) J.* 1971, 27(10), 59-64 (Eng.). A polyhydroxyether (PKPA 8424) prepd. from bisphenol A and epichlorohydrin was modified by crosslinking with isocyanates, trimellitic anhydride (I) [552-30-7] and melamine-formaldehyde resin (II) [9003-08-1] to give improved HEAT and SOLVENT RESISTANCE and HEAT DISTORTION TEMP. with possibility of moderate temp. structural applications. Largest increases in flexural properties were obtained with I and II.

46827x Role of nitrile rubber as a flexibilizing modifier for epoxy resins. Ganguli, K. K.; Debnath, K. K.; Munje, I. L.; Chakravarty, A. P. (Def. Res. Lab. (Mater.), Kampur, India). *Labdev, Part A* 1971, 9(1), 37-9 (Eng.). A mixt. of 9 parts epoxy resin (Araldite CY 230) and 1 part nitrile rubber (I) (39% nitrile) compounded with 100 phr carbon black, cured by 20% (based on epoxy) diphenylguanidine (II) [102-06-7] 1 hr at 160°

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TI Behavior of carbopol gels exposed to sun rays and a Wood lamp. Additives for damage prevention

AU Baruzzi, M. Cristina

CS Italy

SO Nouvelle Revue Francaise d'Hematologie (1971), 11(1), 340-4

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LA Italian

AB Carboxyvinyl polymers of the type Carbopol 940 [9007-17-4] and 941 were degraded by light, type 941 presenting the highest degradation. Efficient protection was provided by addn. of solar filters: a mixt. of Prosolal S9 and Fondix G at 1% and 0.5% resp.

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